REMARKS/ARGUMENTS

This paper is in response to the final Office Action mailed August 23, 2004. By this paper, claims 25 and 27 are amended, claims 16 and 17 are cancelled without prejudice, and claim 28 is added. Accordingly, Claims 25-28 are pending upon entry of this amendment.

Response to Rejection of Claim 27

Claim 27 is directed to a sputter target for use in sputtering aluminum or like metals onto a substrate. It has been discovered that the cause of macroparticle generation during sputtering is the presence of dielectric inclusions having a size greater than about 400-800 μm in the metal sputtering target. Thus, targets having substantially no inclusions therein of a greater size than this threshold are especially useful in the sputtering of large flat panel displays and result, upon sputtering, in a reduction in the amount of macroparticles sputtered onto the substrate. Furthermore, sputter targets having sputter material with inclusions smaller than this threshold, for example in the 100-400 μm range, need not be unnecessarily avoided. More specifically, amended claim 27 is directed to a sputter target comprising, *inter alia*:

> a face area of target material to be sputtered onto a desired substrate, said target material being substantially free of inclusions in said target material of the size of 800 μm and greater and wherein said target material includes a sputter track having a sputter track area adapted for increased consumption of said target material thereat during sputtering, said sputter track having inclusions of the size of between 100 μm to 400 μm therein and being substantially free of inclusions therein of the size of 400 μm and greater.

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Pavate et al. (U.S. Pat No. 6,001,227). Applicants respectfully request this rejection be withdrawn in view of Applicants' comments below. Applicants submit that claim 27 is patentable over the references of record, and particularly over Pavate et al. and Leroy et al., because the cited art does not show or suggest the desired feature of a sputter target being substantially free of inclusions in said sputter track of the size of 400 μm and greater while having inclusions of the

size of between 100 μm to 400 μm therein.

As pointed out by the Examiner on page 3 of the Office Action, Pavate et al. disclose a sputter target having essentially no dielectric inclusions of metal oxides such as Al_2O_3, nitride precipitates and carbide precipitates of sizes larger than about 1 micron. Pavate et al. does not teach Applicants' range of permitable inclusion size with "sufficient specificity" so as to anticipate or make obvious Applicants' claimed invention. However, to further clarify the invention, claim 27 has been amended to claim a sputter track being substantially free of inclusions therein of the size of 400 μm and greater but having inclusions of the size between 100-400 μm. Applicants' claimed range is not rendered obvious because the particular claimed range is not disclosed in Pavate et al. with "sufficient specificity" to constitute an anticipation of the claims and also achieves unexpected results relative to the prior art range.

Applicants have discovered that at a sputtering power of between about 25-30 W/cm^2 (the sputtering power density normally encountered in the sputtering of flat panel displays), inclusions with size greater than about 400 μm are required to produce arcs of sufficient intensity to generate macroparticles. As illustrated in Figure 1 of the Specification, inclusions with surface areas between 100-400 μm can generate arcs, but the intensity of the arcs is not sufficient to melt the aluminum target spot and provide a large enough pressure wave to eject molten metal droplets. That is, inclusions of this size don't result in substantial macroparticle deposition. However, above this threshold, the arcs have sufficient energy to melt a small spot on the target and eject molten metal droplets from the target. (See Fig. 1; page 3, lines 18-30). The Pavate reference teaches that particulates on the order of one micron and greater should be eliminated from the aluminum targets. Nowhere does the cited reference teach a sputter target having Applicants' 400 μm threshold for inclusions.

Accordingly, Pavate et al. fails entirely to teach or suggest the advantages of a sputter target being substantially free of inclusions in the sputter track of the size of 400 μm and greater while having inclusions of the size of between 100 μm to 400 μm therein as now required by claim 27. Accordingly, claim 27 is not anticipated by or made obvious by the cited reference.

U.S. Patent 5,955,673 issued to Leroy et al. is directed to a process for ultrasonic inspection for testing the internal soundness of cathode sputtering targets. Leroy teaches

minimizing inclusions having a size greater than 100 μm for applications requiring a high degree of etching fineness. Accordingly, Leroy et al. cannot cure the deficiencies of Pavate et al.

Accordingly, the cited art fails to teach or suggest the advantages of a sputter target being substantially free of inclusions in the sputter track of the size of 400 μm and greater while having inclusions of the size of between 100 μm to 400 μm therein as now required by claim 27. Accordingly, claim 27 is not anticipated by or made obvious by the cited references and favorable consideration of the claim is respectfully requested. Claims 25, 26 and 28, depending from claim 27, are patentable over the cited art for at least the same reasons.

In view of the Examiner's earlier restriction requirement, Applicants retain the right to present Claims 1-15 and 18-24 in a divisional application.

Conclusion

In view of the remarks made herein, Applicants submit that the claims presented herein are patentably distinguishable from the art applied and prompt allowance of the application is respectfully requested.

Should the Examiner determine that anything else is desirable to place this application in even better form for allowance, the Examiner is respectfully requested to contact the undersigned by telephone.

Respectfully submitted,
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October 27, 2004